

REMARKS/ARGUMENTS

In view of the foregoing amendments and following remarks, favorable reconsideration of the pending claims is respectfully requested.

Informal Matters

An English Translation of the Opposition Proceeding in which the Puhakka article was cited is attached as requested by the Examiner.

Status of the claims

Claims 1-6, 8-12, 14, 15, and 26 are currently pending.

Claims 1 and 26 have been amended. Specifically, Claim 1 has been amended to delete the step of “adding weak white liquor to the green liquor” and “controlling an amount of the weak white liquor added to the green liquor”. Claim 1 has further been amended to recite the step of updating the model by using the measurement result of the density and the measurement result of the total titratable alkali. Claim 26 has been amended to delete the step of by “introducing an effective amount of a white liquor stream into said green liquor inlet stream.”

Prior Art Rejections

Claims 1-6, 8-12, 14, 15, and 26 under 35 U.S.C. § 103(a) as being unpatentable over the combination of Baines, Musow, Hultman et al. Engdahl, Bertelsen and newly cited Puhakka article.

The Office Action relies on Baines for the teaching of using a computer to control a causticization and that the computer can monitor any parameter characteristic of the system. The Office Action relies on Musow for teaching that variables can be measured in the causticizing system. The Office Action relies Hultman for allegedly teaching the measurement of green density and control of white infeed. The Examiner asserts that combination of the references teaches a process of controlling the causticization reaction in which parameters such as density, TTA, and alkali strength are measured to better exert control over the process. The Examiner also asserts that Puhakka teaches the claimed TTA model. The Examiner has taken the position that the workings of how a computer system works and makes calculations is conventional and it would therefore be obvious to use a computer to monitor the density or alkali in the process of Baines because doing so asserts control over the process for monitoring for optimum results.

Combination does not disclose or suggest the claimed invention.

The Examiner has failed to make a *prima facie* case of obviousness because 1) the combination of references fails to teach each and every claim element and 2) because there is no motivation to combine the references. Specifically, the combination of references fails to teach at least any one of the following:

- a. calculating a set value for the density of the green liquor based on a model that relates total titratable alkali (TTA) to green liquor density; or
- b. updating the model using the measurement result of the density and total titratable alkali.

In the invention as claimed in independent Claims 1 and 26, it is important that a target value for the total titratable alkali is determined and the density of the green liquor is adjusted. Further, it is important that the set value of the density is specified as defined in the claims.

In sharp contrast, in conventional methods such as those relied described in the art cited by the Examiner (e.g., Bertelsen), a direct correlation between the TTA and density is presumed. In this regard. Applicants have attached figures or measurements that show the relation between TTA and density. As can be seen from the measurement results, the correlation between TTA and density is very vague. In the conventional methods, such as those cited by the Examiner, it is presumed that the direct lien drawn to the figures describes the alleged correlation. As such, if this direct correlation is used, the result is very poor in most cases.

In comparison, in the claimed process the model is updated using the measurement of the density and TTA so that the density can be reliably and accurately controlled. The conventional method only utilize the shown in the attached figures and accordingly use the correlation:
 $D=TTA/kk.$

However, in the claimed invention, the same line is also used in addition to an offset that is determined by the measurement results of the density and the measurement result of the TTA. Thus, the claimed the claimed invention utilizes the correlation:
 $D+(TTA+os)/kk.$

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The use of the offset determines the height where the line is situated in the coordinate system. Such a model utilizing an offset is not disclosed or suggested by the cited art.

Further, the combination of the cited art, and in particular, the Puhakka article, does not disclose specifying the set value of the density of the green liquor by:

determining a target value for the total titratable alkali;

measuring the total titratable alkali in the green liquor being fed to the slaker;

providing a model that relates green liquor density to the measured total titratable alkali in the green liquor;

calculating the set value for green liquor density based on the measured total titratable alkali in the green liquor, the target value for the total titratable alkali, and the model; and,

updating the model by using the measurement result of the density and the measurement result of the total titratable alkali, as recited in independent Claim 1.

In the Puhakka article the set value for the density of the green liquor is specified only on the basis of the production target a shown in Figure 8 of the Puhakka article. Thus, Pukahha fails to provide for the deficiencies of the previously cited art and therefore the combination of references fails to disclose or suggest calculating a set value for the density of the green liquor based on a model that relates total titratable alkali (TTA) to green liquor density, and updating the model using the measurement result of the density and total titratable alkali.

Claim 11, which is dependent on Claim 1, and Claim 26 recite that the density of the green liquor is calculated according to the following equation:

$$D = (TTA + os)/kk,$$

wherein: D is the green liquor density;

TTA is the total titratable alkali of the green liquor;

os is an offset; and

kk is a constant angular coefficient, wherein the coefficient is a constant angular coefficient the value of which is between 0.9 and 1.4 when the unit used for expressing the TTA and the density is the same,

the offset being determined on the basis of the model.

None of the cited references disclose or suggest the above recited equation. The Examiner has failed to show where the equation and its various variables can be found in the references. As noted above, none of the cited art teaches a model in which an offset is used to determine the height where the line is situated in the coordinate system and thereby provide a more accurate method of controlling the caustication reaction.

In maintaining the rejection, the Examiner relies on vague statements that the workings of how the computer makes calculations are known and therefore it would be obvious to use the equation recited in Claims 11 and 26. However, such statements cannot support an obviousness rejection. If the Examiner's assertion was true, it is a wonder that any additional patents utilizing mathematical equations and computers could ever be obtained. The Examiner has the burden of showing where the equation recited in Claims 11 and 26 is disclosed or suggested in the cited references. In the present case, it is respectfully submitted that the Examiner has failed to meet this burden.

No Motivation to combine teachings

Applicants respectfully submit that one of ordinary skill in the art would have no motivation to combine Baines with anyone of Musow Hultman et al. Engdahl, Bertelsen or the Puhakka article in the manner contemplated by the Examiner. Specifically, neither Baines nor Musow provide the motivation to combine the computer process of Baines with variable measurements described in other references. Further, one of ordinary skill in the art would not expect that the references can be combined in a predictable manner.

First, the methods described in Baines and the other cited references are completely different from each other. Baines teaches controlling the amount of lime added to the slaker, whereas Musow teaches maintaining the sodium carbonate concentration at a desired concentration by adjusting the amount of weak wash solution that is added to the dissolving tank. These steps utilize different methods and different chemical reactions for controlling the causticizing reaction, and occur at completely separated points in the Kraft process. As such, one of ordinary skill in the art would not be motivated to select disparate and unrelated elements from Baines to be combined with unconnected elements of Musow.

As noted above, Musow teaches regulating the sodium carbonate concentration of a green liquor in a dissolving tank by measuring conductivity of the green liquor in the dissolving tank.

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See e.g., column 2, lines 44 – 47. In particular, Musow teaches calculating the concentration of a single component, e.g., utilizing conductivity measurements, to maintain a desired level of sodium carbonate within the green liquor.

In sharp contrast, Baines includes multiple statements that teach away from using measurements, such as conductivity, in controlling the causticizing reaction. First, Baines repeatedly emphasizes that using a single characteristic, such Na_2CO_3 concentration, conductivity, TTA, or density, in controlling the causticization reaction provides less accuracy and therefore is undesirable. For example, Baines states that “a measurement of a single characteristic of the entire white or green liquor, as taught by Bertelsen, can result in error....” See column 2, lines 27-29. Baines further elaborates that “Bertelsen teaches that the progress of the causticizing reaction can be measured by making a differential conductivity measurement.” See column 2, lines 17 – 19. From these excerpts, it can be seen that Baines clearly teaches away from the process described in Musow, and away from using measurements, such as TTA or density, as recited in the claimed process. Baines further states at column 6, lines 10 – 14 that [r]ather it is the determination of the relative concentrations of the liquor components, as opposed to a measurement of a characteristic of the total liquor that is important to the methods of the present invention.” Thus, the teachings of Baines include numerous statements that would teach away from the combination of Baines and Musow.

Hultman, Engdahl, Bertelsen and Puhakka article also fail to provide the necessary motivation to combine the references. Engdahl is completely silent with respect to measurements, such as density, TTA, and the like. Hultman describes measuring carbonate ion concentration of the starting green liquor, and the carbonate ion content of the causticized white liquor to determine how much lime is to be added to the slaker. As discussed above, Baines teaches against using such measurements. In fact, Baines specifically teaches the undesirability of the method described in Hultman. For example, Baines states that the “the Hultman method measures only a sample of the liquor. The measurement is relatively complex in that it involves introducing an additional reaction to create a by-product, CO_2 , that can be measured. The measurement of CO_2 is not directly related to the causticizing reaction and is therefore only an inferred measurement.” See column 2, lines 8 – 14. Thus, Baines clearly teaches away from the process described in Hultman and one of ordinary skill in the art would not be motivated to

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modify the process of Baines to include measuring single components of the green and white liquors as taught in Hultman.

It is clear that Baines goes to great extent to distance the process described therein from the teachings of Musow and Hultman, which utilize a single measurement, such as conductivity or carbonate ion concentration, to control the causticization process. In light of this clear teaching away from Musow and Hultman, there would be no motivation to combine the teachings of Baines with either Musow or Hultman in the manner contemplated by the Examiner. For this additional reason, Applicants respectfully request that the Board overturn the rejection of record.

Further, one of ordinary skill in the art would not expect that the measurements of Musow or any of the other cited references could be successfully combined with the teachings of Baines to arrive at the claimed invention. In fact, the teachings of these references lead to the conclusion that they cannot be combined in a predictable manner. In other words, one of ordinary skill in the art would not predict that Baines could successfully be combined with any one or Musow, Hultman, Engdahl, Bertelsen or Puhakka to provide a process that facilitates control over the causticizing process because Baines specifically teaches against using the measurements described in these references. For this additional reason, the rejections based on the combination of Baines Musow, Hultman, Engdahl, Bertelsen and Puhakka should be withdrawn.

Further, Musow also teaches away from the claimed invention. Specifically, Musow states that conductivity measurements are superior and more accurate than indirect measurements such as TTA measurements of the green liquor. For example, Musow states “[t]he above-described method regulates sodium carbonate concentration based on measurements that are more accurate than such indirect measures as density of the green liquor or total titratable alkali in the green liquor.” See e.g., column 2, lines 58 – 63. By teaching that TTA measurements are inferior, Musow teaches away from using TTA measurements of a green liquor for control purposes, and one of ordinary skill in the art would not be motivated to combine the conductivity measurements, or even TTA measurements, of Musow with a control system such as the Baines system. Thus, one of ordinary skill in the art would not be motivated to combine Baines and Musow with each other or with Bertelsen.

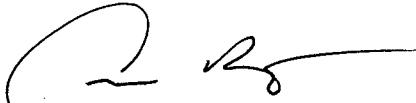
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In maintaining the rejections, the Examiner has repeatedly ignored the multiple teachings in both Baines and Musow that teach away from the claimed invention and teach away from the combination of Baines and Musow. Therefore, it is respectfully requested that the rejections of the claims based on the combination of Baines, Musow, Hultman, Engdahl, Bertelsen and Puhakka should be withdrawn.

Conclusion

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,



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The ruling of the Board of appeals: The appeal is accepted, the decision of the National Board of Patents and Registration is repealed and the matter is returned to the National Board of Patents and Registration for revocation of Patent No. 114813.

Grounds: According to publication FI 76137 (page 4, lines 29 to 32), causticizing degree may be maintained by keeping the specific weight of green liquor and, thus, also the TTA value constant. In addition, it has been noted (page 7, lines 26 to 30) that the TTA and specific weight of green liquor correlate to a sufficient extent, that is, by measuring one, the other may be calculated with a formula obtained (page 14) by measuring the specific weight and TTA. Further, (page 10, lines 12 to 26) measuring signals may be used to control the properties of white liquor by controlling the amount of burnt lime fed into the slaker, by controlling the amount of green liquor fed into the slaker and/or by controlling the TTA value of green liquor, whereby it is possible to use a data processing device to calculate the changes required on the basis of the measuring results. In the calculations, measured values are used (page 11, lines 3 to 10) to obtain the target values. In controlling the process (Figure 1, page 13, lines 10 to 19), various quantities are measured, among other things, the specific weight/TTA (18), and the measuring signals are sent to calculation units (22, 23, 25), from which control signals (24, 26) are transmitted for the purpose of controlling the amount of burnt lime, the amount of green liquor, or the TTA value of green liquor. Thus, in the control according to the publication, essentially the same procedures are followed as in the control of Patent No. 114813 and, therefore, keeping the patent in force in the amended form approved in the decision under appeal is not justifiable.

A remark is added to the independent claims submitted to the Board of Appeals that weak white liquor is added to green liquor, and the amount of white liquor is controlled to control the density of green liquor. There is no mention in the earlier claims how density is controlled, but the essential thing was that density is controlled. According to publication FI 76137 (page 1, lines 18 to 27),

green liquor is made by directing melt accumulated at the bottom of a boiler used to burn black liquor into a container containing water or weak lye, and there the melt dissolves and green liquor is formed. On the basis of this, it is obvious to a person skilled in the art that it is possible to affect the density of green liquor by altering the amount of weak lye therein, so the actual density control method is not inventive *per se*.

According to the characterizing part of claim 1: 1) the density is controlled toward a set value, 2) a set value is defined, and 3) the density is controlled by utilizing the measuring results (and model?) of density and TTA. Item 3) does not provide any added value to what is stated in item 2), so it is unnecessary. Control toward a set value is common in control, so item 1) does not contain a new control technique. The definition of a set value according to item 2) does not contain anything unexpected to a person skilled in the art in view of what is stated in the above-mentioned items of publication FI 76137.

The article in "31st Pulp and Paper Annual Meeting, Sao Paulo, 1998" mentioned in the rejoinder of Andritz Oy dated 5 August 2008 discloses (pages 709 to 710, paragraphs 'Valmet Kajaani Causticizing Control' and 'Green Liquor TTA Control', Figure 8) that feed measurements for causticization control include, among other things, density, flow, and alkali strengths, and that control generates various output data, such as control of green liquor TTA together with density. Figure 8 and the text (the above-mentioned paragraphs) disclose that the density (D) of green liquor fed into the slaker and the TTA (1) are measured and, between the TTA and density, a model is created that is constantly updated with alkali and density measurements. On the basis of the model, the operator enters a set value for the TTA that is also used to control the density with the model. Thus, the control according to the article takes place in essentially the same way as presented in the new claims, so the claims contain nothing unexpected to a person skilled in the art, and keeping Patent No. 114813 in force in the form defined in the claims is not justifiable.

Tapio Priia

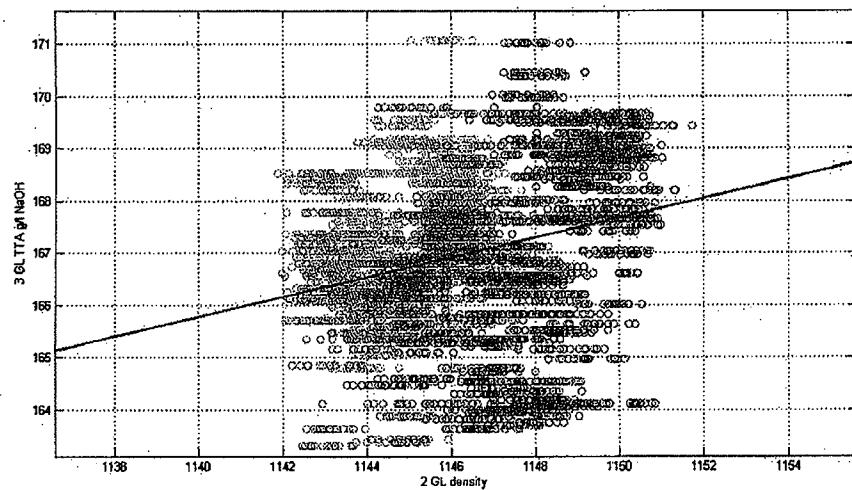
Hannu Kaisko

Involved in the decision-making were: Mr Priia, Director, and Messrs Laukkarinen and Kaisko (presenting official), Chief Engineers.

Appeal instructions are attached.

X-Y plot, 2 GL density, 3 GL TTA g/l NaOH, modeling, preprocessed

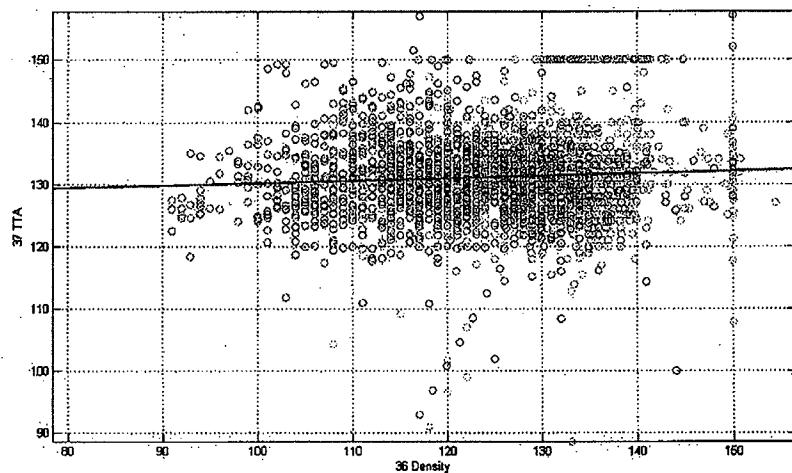
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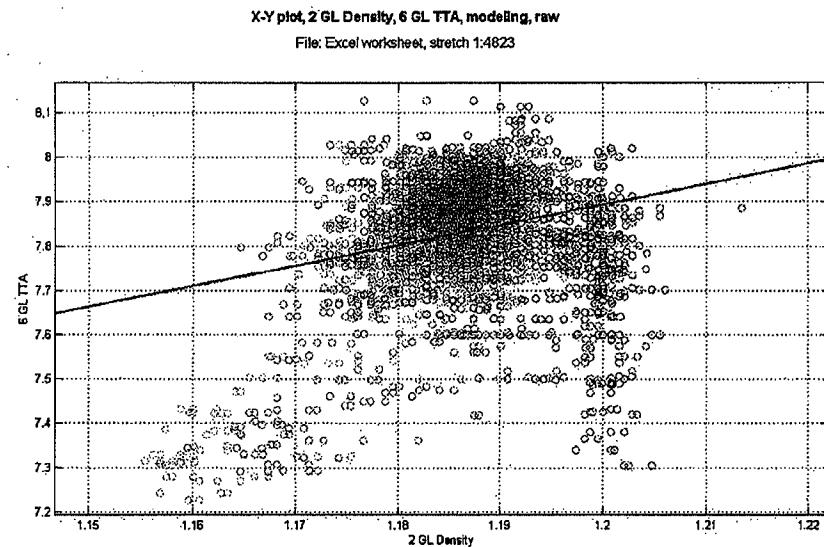
$y = +0.1835 \pm 0.008344x - 49.621 \pm 0.128$, linear $r = 0.24653$, $R^2 = 0.061$

X-Y plot, 36 Density, 37 TTA, modeling, preprocessed

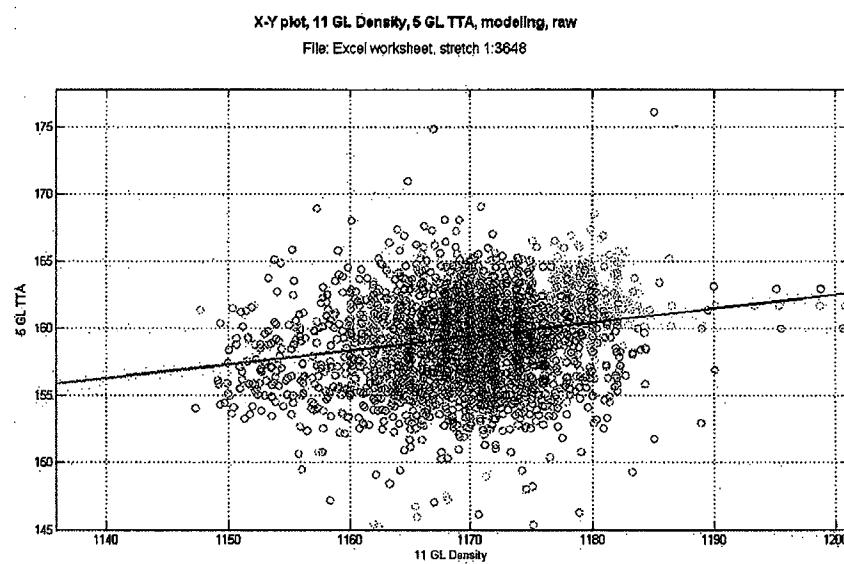
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$y = +0.03854 \pm 0.012652x + 126.3755 \pm 1.5809$, linear $r = 0.05885$, $R^2 = 0.003$



$y = +4.5009 \pm 0.2643x + 2.3555 \pm 0.31356$, linear $r = 0.24709$, $R^2 = 0.061$



$y = +0.10391 \pm 0.0076222x + 37.8607 \pm 9.156$, linear $r = 0.21892$, $R^2 = 0.048$